CLAIMS

1. In the transmission of a multidimensional digital frame structure, a method for variably programming the location of frame synchronization bytes, the method comprising:

defining a frame with an overhead section having a predetermined number of bytes; and

selecting the location of the bytes in the overhead section to be used for frame synchronization.

2. The method of claim 1 wherein defining the frames includes the overhead section having a first plurality of overhead byte locations; and

wherein selecting the location of the bytes in the overhead section to be used for frame synchronization includes selecting locations in the range from zero to the first plurality of byte locations.

3. The method of claim 2 further comprising:

selecting the number of bytes in the overhead section to be used for frame synchronization.

4. The method of claim 3 wherein selecting the number of bytes in the overhead section includes selecting a first number of bytes in the range from zero to the first plurality of bytes; and

wherein selecting the location of the bytes in the overhead section to be used for frame synchronization includes selecting the first number of byte locations.

5. The method of claim 2 further comprising:

defining a superframe structure with a predetermined number of frames per superframe; and

wherein selecting the location of frame synchronization bytes in the overhead section includes selecting the location of bytes in the overhead section of each frame.

6. The method of claim 5 wherein defining a superframe structure with a predetermined number of frames per superframe includes defining a first and a second frame in the superframe; and

wherein selecting the location of frame synchronization bytes in the overhead section includes selecting a first byte location in the first frame and a second byte location in the second frame.

7. The method of claim 6 wherein defining a superframe structure with a predetermined number of frames per superframe includes defining a superframe consisting of a first, second, third, and fourth frame; and

wherein selecting the location of frame synchronization bytes in the overhead section includes selecting a first byte location in the first frame, a second byte location in the second frame, a third byte location in the third frame, and a fourth byte location in the fourth frame.

8. The method of claim 7 wherein selecting the location of frame synchronization bytes in the overhead section includes selecting no byte locations in the second, third, and fourth frames.

9. The method of claim 2 further comprising:

selecting the value of the frame synchronization bytes.

10. The method of claim 9 wherein defining a frame includes defining each byte having a second plurality of bits; and

wherein selecting the value of the frame synchronization bytes includes selecting a second plurality of bits for each frame synchronization byte value.

11. The method of claim 10 wherein selecting the location of frame synchronization bytes in the overhead section includes locating a plurality of frame synchronization byte values in a plurality of byte locations.

12. The method of claim 11 wherein selecting the location of frame synchronization byte values includes selecting frame synchronization bytes, having a first value, in a first location, and frame synchronization bytes, having a second value, in a second location.

13. In the receiving of a multidimensional digital frame structure, a method for variably programming the location of frame synchronization bytes, the method comprising:

defining a frame with an overhead section having a predetermined number of bytes; and

selecting the location of the bytes in the overhead section to be used for frame synchronization.

14. The method of claim 13 further comprising:

selecting the bit error rate required for the recognition of a frame synchronization byte.

15. The method of claim 14 wherein selecting a frame synchronization byte bit error rate includes selecting an average bit error rate for the frame synchronization bytes in the selected location.

16. The method of claim 14 wherein selecting the location of frame synchronization bytes includes selecting frame synchronization bytes, having a first bit error rate, in a first location, and frame synchronization bytes, having a second bit error rate, in a second location.

17. The method of claim 13 further comprising:

selecting the number of bytes in the overhead section to be used for frame synchronization.

18. The method of claim 13 further comprising:

selecting the value of the frame synchronization bytes.

19. A method for variably programming the location of frame synchronization bytes in the communication of a multidimensional digital frame structure, the method comprising:

selecting the location of frame synchronization bytes in the overhead section of a transmitted frame;

sending the frame;

receiving the frame; and

synchronizing the received frame in response to recognizing the frame synchronization bytes.

20. The method of claim 19 further comprising:

selecting the number of consecutive frames that must be recognized; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes synchronizing the received frame in response to the selected number of recognized frames.

21. The method of claim 20 further comprising:

selecting the location of the bytes to be used for the frame synchronization of received frames; and

wherein synchronizing the received frames includes recognizing frame synchronization bytes in response to the selected locations of the frame synchronization bytes in the received frame.

22. The method of claim 21 wherein selecting the location of the frame synchronization bytes in the received frame includes selecting first locations; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes synchronizing the received frame in response to recognizing frame synchronization bytes in the first locations.

23. The method of claim 21 wherein selecting the location of the frame synchronization bytes in a transmitted frame includes selecting first locations in a first frame of the superframe, and second locations in a second frame; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes synchronizing the received frame in response to recognizing frame synchronization bytes in the first locations in the first frame and the second locations in the second frame.

24. The method of claim 21 wherein selecting the location of frame synchronization bytes in the overhead section of a transmitted frame includes selecting a first number of frame synchronization byte locations; and

wherein selecting the location of the bytes to be used for frame synchronization of the received frame includes selecting locations for the first number of frame synchronization bytes.

25. The method of claim 21 wherein selecting the location of frame synchronization bytes in the overhead section of a transmitted frame includes selecting a first number of frame synchronization bytes in a location;

wherein selecting the location of the bytes to be used for frame synchronization of the received frame includes selecting a second number of frame synchronization bytes in the location, less than the first number; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes synchronizing the received frame in response to recognizing the second number of frame synchronization bytes in the selected location.

26. The method of claim 21 further comprising:

selecting the bit error rate required for the recognition of a frame synchronization byte in a received frame.

27. The method of claim 26 wherein selecting a bit error rate includes selecting an average bit error rate for the frame synchronization bytes in the selected locations.

28. The method of claim 26 wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes recognizing frame synchronization bytes having a bit error rate less than, or equal to, the selected frame synchronization bit error rate.

29. The method of claim 21 further comprising:

defining a superframe structure with a predetermined number of frames per superframe; and

wherein selecting the location of frame synchronization bytes in the overhead section of a transmitted frame includes selecting the location of bytes to be used for synchronization in the overhead section of each frame of the superframe;

wherein sending the frame includes sending frames in the superframe structure; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes recognizing the location of frame synchronization bytes in each frame of the superframe.

30. The method of claim 21 further comprising:

selecting the number of frame synchronization bytes required for the recognition of a received frame.

31. The method of claim 30 wherein selecting the number of frame synchronization bytes required for the recognition of a received frame includes selecting a number of bytes for each frame of the superframe; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes recognizing the selected number of frame synchronization bytes in each frame of the superframe.

32. The method of claim 31 wherein selecting the number of frame synchronization bytes required for the recognition of a received frame includes selecting a first number of frame synchronization bytes in a first number of locations of a first frame; and

wherein synchronizing the received frame in response to recognizing frame synchronization bytes includes recognizing the first number of frame synchronization bytes in the first number of locations of the first frame.

33. The method of claim 21 further comprising:

selecting the value of the frame synchronization byte in each byte location; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes recognizing the values of the frame synchronization bytes in the selected locations.

34. The method of claim 33 wherein selecting the value of each frame synchronization byte includes selecting a first frame synchronization value in first locations, and a second frame synchronization value in second locations; and

wherein synchronizing the received frame includes synchronizing the received frame in response to recognizing the first frame synchronization value in the first locations, and the second frame synchronization value in the second locations.

35. The method of claim 29 further comprising:

selecting the value of the frame synchronization byte in each selected location of the transmitted frame.

36. The method of claim 35 wherein selecting the value of the frame synchronization byte in each location of the transmitted frame includes selecting frame synchronization bytes having a first value in first locations;

wherein selecting the value of each frame synchronization byte in the received frame includes selecting frame synchronization bytes, having the first value in the first locations.

37. The method of claim 35 wherein selecting the value of the frame synchronization byte in each location of the transmitted frame includes selecting a first frame synchronization byte value in first locations and a second frame synchronization byte value in second locations;

wherein selecting the value of each frame synchronization byte in the received frame includes selecting the first frame synchronization byte value in third locations, fewer in number than the first locations, and the second frame synchronization byte value in fourth locations, fewer in number than the second locations; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes synchronizing the received frame in response to recognizing the frame synchronization bytes

having the first value in the third locations, and the of frame synchronization bytes having the second value in the fourth locations.

38. In a multidimensional digital frame structure, a transmitter system for variably programming the location of frame synchronization bytes, the system comprising:

a frame generator including an overhead generator to generate the overhead section of a frame, a payload generator to generate the payload section of the frame, and an encoder to provide forward error correction (FEC) for the frame; and

wherein the overhead generator includes an input to select the location of frame synchronization bytes in the overhead section.

39. The system of claim 38 wherein the frame generator supplies a frame with a first plurality of overhead bytes; and

wherein the overhead generator accepts commands to select byte locations in the range from zero to the first plurality.

40. The system of claim 39 wherein the frame generator forms a superframe structure with a predetermined number of frames per superframe; and

wherein the overhead generator supplies a selectable number of frame synchronization byte locations for the overhead section of each frame of the superframe.

41. The system of claim 40 wherein the frame generator forms a superframe having a first, second, third, and fourth frame; and

wherein the overhead generator supplies first selected frame synchronization byte locations for the first frame, second frame synchronization byte locations for the second frame, third frame synchronization bytes for the third frame, and fourth frame synchronization bytes for the fourth frame.

42. The system of claim 38 wherein the overhead generator accepts commands to select the number of frame synchronization bytes.

43. The system of claim 38 wherein the overhead generator has an input to accept commands for selecting the value of the frame synchronization bytes in each selected byte location.

44. The system of claim 43 wherein the overhead generator selects a second plurality of bits for each frame synchronization byte, where each byte includes the second plurality of bits.

45. The system of claim 44 wherein the overhead generator selects frame synchronization byte values from a plurality of byte values.

46. The system of claim 45 wherein the overhead generator selects frame synchronization byte values in the range from zero to the first plurality, for each frame.

47. The system of claim 46 wherein the overhead generator selects frame synchronization bytes having a first value in first locations, and frame synchronization bytes having a second value in second locations.

48. In a multidimensional digital frame structure, a receiver system for variably programming the location of frame synchronization bytes, the system comprising:

a frame receiver including an overhead receiver to receive the overhead section of a frame, a payload receiver to receive the payload section of the frame, and a decoder to provide a forward error corrected (FEC) frame; and

wherein the overhead receiver includes an input to select the location of frame synchronization bytes in the overhead section to be used for frame synchronization.

49. The system of claim 48 wherein the frame receiver supplies a frame with a first plurality of overhead byte locations; and

wherein the overhead receiver accepts commands to select frame synchronization byte locations in the range from zero to the first plurality.

50. The system of claim 49 wherein the frame receiver forms a superframe structure with a predetermined number of frames per superframe; and

wherein the overhead receiver selects the location of frame synchronization bytes required for the recognition of a received frame from the overhead section of each frame of the superframe.

51. The system of claim 50 wherein the overhead receiver selects the number of frame synchronization bytes.

52. The system of claim 48 wherein the frame receiver forms a superframe with a first, second, third, and fourth frame; and

wherein the overhead receiver selects first frame synchronization byte locations for the first frame, second frame synchronization byte locations for the second frame, third frame synchronization bytes for the third frame, and fourth frame synchronization bytes for the fourth frame.

53. The system of claim 48 wherein the overhead receiver has an input to accept commands for selecting the value of the frame synchronization bytes for each byte location.

54. The system of claim 53 wherein the overhead receiver selects a second plurality of bits for each frame synchronization byte value, where each byte includes a second plurality of bits.

55. The system of claim 54 wherein the overhead receiver selects frame synchronization byte values from a plurality of byte values.

56. The system of claim 55 wherein the overhead receiver selects frame synchronization byte values, in each frame, in the range from zero to the first plurality of byte values.

57. The system of claim 56 wherein the overhead receiver selects frame synchronization bytes, having a first value, in first byte locations, and frame synchronization bytes, having a second value, in second byte locations.

58. The system of claim 48 wherein the overhead receiver has an input to accept commands for selecting the bit error rate required for the recognition of each selected frame synchronization byte location.

59. The system of claim 58 wherein the overhead receiver selects an average bit error rate for frame synchronization bytes in the selected locations.

60. A system for variably programming the location of frame synchronization bytes in the communication of a multidimensional digital frame structure, the system comprising:

a transmitter with a frame generator including an overhead generator having an input to accept commands for selecting the location of

frame synchronization bytes in the overhead section of a transmitted frame; and

a receiver with a frame receiver including an overhead receiver having an input to accept commands for selecting the location of frame synchronization bytes required for synchronizing the received frame, the overhead receiver synchronizing the frame in response to recognizing the frame synchronization bytes.